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FASTENING PIN

TECHNICAL FIELD

The object of the invention is [[the]] a fixture fastening pin, ~~especially~~ particularly for ~~fastening with~~ attaching fixtures to floors, walls, or similar objects, by insertion [[it to]] into pre-drilled holes. This pin is particularly suitable for fixing threshold cover ~~masking~~ strips.

BACKGROUND ART

Commonly known and applied pins for fastening into [[in]] walls [[are]] mostly consist of [[in]] two parts, where one part is made mainly with plastic and is expanded in the pre-drilled hole by another insertion ~~detail~~, ~~mostly~~ usually [[by]] a metal screw. In many cases such solution is not satisfactory.

Also is known [[is]] an anchoring pin, e.g. as per the description of the ~~polish patent specification~~ Polish Patent No 176358, with ~~details locking in hole~~ insertion positively locked into a hole by means of bonding [[mix]] mixture[[, in]] which completely fills the clearance between the hole and the pin, ~~in locking details are in a shape of ribs distributed round anchoring pin and on its side wall with~~

~~maintained mutual distances in axial direction.~~ being anchored by filling grooves at intervals along the length of the anchoring pin.

~~With announcement~~ From the description of the European Patent No. EP 0588734 [[it]] is known [[the]] a threshold strip being in the form ~~is in a shape~~ of longitudinal profile [[,]] ~~which comprise the guide of fastening~~ of a uniform cross-section that includes a keyway to accommodate a nail head of another type of fixing pin. The [[Above]] above mentioned strip may have a curved top surface and the concave underside of its longitudinal surface determines the alignment of the nail in the guide and allows some variability when fastening the threshold strip onto adjoining base surfaces of unequal ~~guide has surface like V letter and it's longitudinal edge designates the rotation axis of the nail in guide. This is to allow in certain scope fastening of threshold strip onto foundation of differential~~ height.

From US 5,800,109 a fastener comprises head fins and a shaft. The shaft comprises a tapered section and an untapered section.

From US 5,306,098 a one-piece plastic drive fastener comprises an enlarged head with a rigid cylindrical shank extending therefrom and terminating in a free end. Four circumferentially spaced axial rows of wing elements extend generally radially outwardly from the shank. The wing elements each have the shape of a segment of a thin walled truncated cone

with a narrow first end joined to the cylindrical shank and a wider second end spaced outwardly of the shank and inclined toward the head portion.

From US 4,381,633, the fastener is of non-corrosive plastic construction having a plurality of angled resiliently-deformable teeth which, when inserted through a hole in the shutter into a mounting hole formed in a building wall, tend to flex in the direction of insertion and tend to return to their original position to resist removal.

From US 4,395,174 a fastener for anchoring a sheet-metal roofing panel to the top horizontal web of a roof-supporting sheet-metal beam, comprises a headed shank having an enlarged tip end constructed to penetrate said roofing panel and the underlying web of the panel's supporting beam, by being either percussively driven or rotatingiy bored therethrough.

From US 5,907,891, fastener includes a longitudinal shank of generally H-shaped cross section. The H-shaped cross section is formed of opposed lateral sides and longitudinal cross member. Additionally, opposed lateral sides are spaced by transverse supports. The outer ends of opposed lateral sides respectively, are coextensive with a portion of the circumference of the circular base of conical head.

AIM OF THE INVENTION

The purpose of the present invention ~~In solution by this invention there~~ is to develop a fastening pin which does not there ~~proposed a pin~~ which does not require ~~demand~~ the application of ~~onerous setting~~ mortar ~~and simultaneously it will effectively fasten objects with wall.~~ or another bonding mixture and avoids, or at least greatly diminishes, the disadvantages known from prior art.

DISCLOSURE OF THE INVENTION

The ~~matter of the solution according to the invention is that the~~ present invention relates to a fastening pin, which is provided with elastic protrusions, ideally spade-shaped and which are molded around the longitudinal axis of ~~advantageously in a shape of convergent geometric figures which are located around the core of~~ the pin ~~and external dimension of protrusions is larger than the hole dimension.~~ providing a free overall external diameter greater than the diameter of the pre-drilled hole and thereby being an interference fit producing a self-locking effect.

It is ~~advantageous when~~ desirable that the spade-shaped protrusions are ~~situated with an~~ arranged at a slightly acute angle to the pin's longitudinal axis, pointing towards [[it's]] its head. Such arrangement of the protrusions [[allow]] allows the ready insertion of

the pin into hole, provides positive ~~and simultaneously effectively prevents it's draw out from the hole.~~ self-locking in the pre-drilled hole and at the same time effectively prevents it being easily withdrawn.

The proposed solution is such one in which the protrusions are flexible and in a shape of narrowly truncated pyramids with rectangular [[base]] bases (spade-shaped protrusions). Such ~~form of~~ protrusions ~~includes many featheredges which find for them it's engagement in a hole.~~ may have narrow highly flexible outer tips which allow them to come into intimate contact with the walls of the hole.

~~There is also foreseen such~~ Also envisaged is a solution ~~There is also foreseen such~~ in which the spade-shaped protrusions are arranged radially over a ~~appears diversification of protrusions~~ cross-~~section~~ sectional area ~~that means protrusions will~~ allowing them to be deflected upwards as the pin is inserted ~~during it's insertion~~ into [[a]] the hole ~~under forces operation of different values.~~

with varying degrees of force. This solution may also include ~~It is also allowed such solution where~~ protrusions [[have]] of unequal height and ~~different~~ where the different ~~height~~ heights of the protrusions may be ~~realized~~ produced both ~~on the core circumference as also lengthwise it's axis~~. around the pin's diameter and along its length. When ~~In a case of~~ manufacturing [[pin]] pins with different

cross-section cross-sections and ~~height~~ lengths it is advantageous that [[lower]] shorter pins should have protrusions with [[an]] larger ~~cross-sectional~~ cross-sections and individual width [[area]].

In alternate ~~solution~~ solutions protrusions may be ~~are made~~ of different ~~material~~ materials than the central ~~pin's core~~ pin material and the protrusions may be in the form ~~have a shape~~ of [[rod]] rods, ~~profitably~~ preferably made of steel. There is also the alternative ~~possible~~ possibility ~~such solution in which the~~ ~~for the~~ pin's core to be made from [[is]] steel made and the protrusions from ~~are made of~~ plastic.

An integral part of the solution is also the top of the pin, ~~The substance of solution is also fastening pin,~~ especially when design for threshold ~~masking~~ strips, ~~having it's head located in channel on the bottom side of strip, and characterized~~ ~~in such a way that it contains a joint between anchored part and head.~~ when the head is located in a keyway formed in the under surface of the strip, and designed in such a way that the pin has a neck between the anchored part and its head.

Preferably, ~~Profitably~~, the neck should have a ~~the joint has a form of mandrel~~ cross-section with a narrowing or constriction, ~~and this narrowing has a shape of circumferential groove on the mandrel.~~ Possibly shaped as a cylindrical, because the narrowing allows the pin to flex at that point. ~~In such a case profitably the pin's head has a~~

~~shape of cylinder, because the narrowing allows bending of the pin in optional plane parallel to it's axis. The mandrel's cross-section area narrowing may be also in grooves form, profitably radial, perpendicular to the pin's axis and grooves may be mutually moved along the pin's axis.~~ The neck's constriction may also be in the form of an indentation or indentations, preferably positioned symmetrically and at right angles to the pin's longitudinal axis.

The invention also ~~anticipates also~~ a fastening pin in which the neck [[joint]] ~~is in flat form having broken it's symmetry axis and profitably equipped onto it's bends with radial grooves forcing the pin's bend place.~~ has a flat form having an asymmetrical longitudinal axis and having with bends with grooves at their points of maximum curvature to allow the pin flex in a pre-determined place. This provides a springing effect.

Also, ~~There is also foreseen~~ envisaged is a pin in which the [[joint]] flexing function is performed by a [[such]] solution in which ~~where the pin's section below it's head is made of material more flexible than the mandrel's material.~~

the lower section of the pin is made of a material more flexible than the material of which the head is made. The flexible material allows the mandrel's bending.

In another solution the joint is of [[the]] a hinge form, in which the pin's head ~~is equipped with protrusions of fork shape in which the pin's mandrel is rotationally mounted by a dowel.~~ has forked arms between which the top end of the neck, suitably shaped, is attached with a dowel.

~~The matter of sequent solution by~~ An essential feature of the invention is that ~~based onto fact that the pin is equipped with elastic protrusions, profitably in a shape of convergent geometric figures, spaced round the pin's core and profitably situated under an acute angle towards it's head axis and these protrusions are~~ situated onto ca. 2/3 of pin length from it's end but the pin's part near head is ~~equipped with stabilizing fins of a trapezoid profile, what creates splines. It is profitable when fins are spaced symmetrical round the axis and having small convergence toward the pin's end as also when the pin's core is provided with joint between fins and head.~~ the lower two-thirds, constituting the main shank of the pin has elastic protrusions, preferably spade-shaped, as described earlier, that are molded around the pin's longitudinal axis. Ideally these protrusions should be slightly inclined towards the head of the pin. The upper part of the pin between the main shank and the neck is provided with tapering longitudinal splines symmetrically set around the core of the pin. The taper narrows towards the lower and (main shank) of the pin and provides for positive

alignment in the pre-drilled hole. The section immediately above this has a designed constriction to allow the head of the pin to flex and thereby to compensate for any drilling errors or unequal heights in the adjoining finishing layers to be covered by the threshold strip.

The solution proposed [[as per]] in the invention also allows [[also]] ~~solid fastens of~~ the pin ~~in wall, without bonding means or details for pin's expansion in a hole.~~ to be firmly located into the vertical surface of a wall without using bonding materials or secondary inserts to make the fitting expand (such as metal screws). The ~~Elastic~~ elastic protrusions, bending [[under]] [[small]] [[force]] [[action]] in response to small forces, allow the easy ~~location~~ insertion of the pin into a hole without using special tools, ~~for drive in, installing the pin into a hole and simultaneously locking it very effectively against it's removal and rotation in a hole.~~ holding it firmly in place thereby preventing both rotation and easy withdrawal. If a permanent, ~~For the purpose to gain~~ very high-strength fitting is necessary, the invention does not preclude the use of ~~strong connection may be used~~ a setting material ~~which will~~ to fill the [[out]] spaces between the protrusions and the ~~hole's wall~~ sides of the hole .

The solution provided by the invention provides ~~allows in a simply manner~~ an easy and highly convenient method for fastening [[of]] threshold ~~masking~~ strip onto floor sills [[ends]] [[in]] of

different adjoining heights and also ~~eccentric connection of other parts.~~ the bridging with similar strips of other parts, however unevenly aligned.

~~The pin's equipment with fins causes that~~ The [[pin's]] pin, being fitted with tapered splines, protects the pin's protrusions from lateral stresses, ~~are not exposed against transverse loads which are received by fins stabilizing pin in the hole's wall. The greater contact surface of the fin with the hole's wall in comparison with the elastic protrusions contact surface prevents against eventual chipping of the hole's periphery and allows transfer of larger transverse loads. The convergence of fins towards the pin's end allows it's insertion to the hole, and eliminates the hole's manufacturing failures, which is often battered during it's drilling in the foundation. Equipment of the pin with joint allows fastening of the floor's masking threshold strip on different heights as also eccentric connection of other details.~~ these being absorbed by the splines positively locating the pin centrally in the hole. The high contact area of the splines with the outward end of the hole as opposed to the minor but multiple contact surfaces of the spade-shaped protrusions tends to inhibit any chipping of the hole's edges and makes the pin able to resist high shear stresses. The tapering of the splines towards the lower/inner end of the pin permits the easy insertion of the latter the hole and compensates for any drilling inaccuracies which often occur

when drilling base material containing inhomogenous particles, such as lumps of aggregate in concrete. By providing the pins with flexing necks it is possible to fasten threshold strips to cover adjoining floor-coverings of uneven height and compensate for any longitudinal unevenness.

BRIEF DESCRIPTION OF THE DRAWINGS

The ~~subject~~ object of this invention is ~~showed~~ shown ~~by an example of performance on the drawing, in which~~ in implementation examples in the enclosed drawings, in which:

~~fig.1~~ Fig. 1 ~~presents~~ shows a perspective ~~the pin's~~ view ~~with protrusions,~~ of a pin;

~~fig. 2~~ Fig. 2 shows enlarged detail ~~of fig. 1,~~ of the pin shown in Fig. 1;

~~fig. 3~~ Fig. 3 shows a view of a pin in place in a pre-drilled hole and a ~~embedded in hole and~~ fastening strip ~~masking~~ covering the floor's expansion gap[[,]];

~~fig. 4~~ Fig. 4 shows a perspective view of pin [[when]] with a head having a ~~is of T letter~~ "T" profile,

~~fig. 5~~ Fig. 5 shows a side elevation [[end]] view of the pin ~~from fig. 1,~~ shown in Fig. 4:

~~fig. 6~~ Fig. 6 shows a perspective view of a round-headed pin

with a narrowing on a neck; ~~in form of radial, circumferential groove onto mandrel,~~

~~fig. 7~~ Fig. 7 shows a side elevation [[end]] view of the pin shown in Fig. 6; ~~from fig. 6,~~

~~fig. 8~~ Fig. 8 shows a perspective view of a pin with ~~joint of grooves shape, perpendicular to pin's axis,~~ twin indentations on opposite sides of a neck and a square head;

~~fig. 9~~ Fig. 9 shows a side elevation [[end]] view of the pin shown in ~~from fig. 8,~~ Fig. 8;

~~fig. 10~~ Fig. 10 shows a perspective view of a pin with a square ~~joint in shape of flat bar with broken symmetry axis,~~ head and a neck in the shape of a double-offset flat bar with a thinner section at each offset;

~~fig. 11~~ Fig. 11 shows a side [[end]] view of the pin shown in Fig. 10; ~~from fig. 10,~~

~~fig. 12~~ Fig. 12 shows a perspective view of a pin with a ~~hinge,~~ hinged head;

~~fig. 13~~ Fig. 13 shows a side elevation [[end]] view of the pin shown in Fig. 12; ~~from fig. 12,~~

~~fig. 14~~ Fig. 14 shows a perspective view of a pin with [[hole,]] a transverse rectangular hole across a neck;

~~fig. 15~~ Fig. 15 shows a side elevation [[end]] view of the pin shown in Fig. 14; ~~from fig. 14,~~

~~fig. 16~~ Fig. 16 shows an example of a pin ~~application for fastening threshold strip on floors end with different height,~~ used to fasten a threshold-strip on two adjoining base surfaces of unequal height;

~~fig. 17~~ Fig. 17 shows a perspective view of a T-headed pin with its various cross sections; ~~protrusions and fins in perspective view,~~

~~fig. 18~~ Fig.18 shows an enlarged detail of the pin shown in Fig. 17; ~~from fig. 17,~~

~~fig. 19~~ Fig. 19 shows a side elevation view of a pin with ~~head like T letter,~~ a "T" head;

~~fig. 20~~ Fig. 20 shows a front elevation view of the pin shown in Fig. 19; ~~with head equipped with joint,~~ and

~~fig. 21~~ Fig. 21 shows a ~~presents pin embedded in hole, and fixing strip for expansion gap masking.~~ cross-sectional view of a pin in place in a pre-drilled hole.

BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the invention will be presented according to the accompanying set of drawings where the novel shape of the pin will be presented.

A [[The]] pin 1, shown in Figs. 1,2 and 3, is equipped with ~~elastic~~ flexible protrusions 2 that are tapered toward their tips ~~in a shape of truncated pyramid with rectangular basis.~~ and

circumferentially distributed along the longitudinal axis of the shank, especially in the shape of narrowly-tapered truncated pyramids with a rectangular base (spade-shaped protrusions). The protrusion axis of the symmetry is situated in the plane of the symmetry of the shank. The ~~Protrusions~~ protrusions 2 are situated at [[under]] an acute angle on the [[for]] pin's longitudinal axis, inclined slightly towards [[it's]] its head ~~direction~~. Individual rows of protrusions are circumferentially distributed ~~shifted each other~~ along the [[pin's]] pin's longitudinal axis. ~~During~~ When ~~insertion~~ inserting [[of]] the pin into the hole 3 the protrusions 2 are deflected ~~towards the pin's axis~~ upwards. ~~Resting on the hole's walls protrusions 2 prevent against it's draw-out as also rotation round axis.~~

Contact with and pressure against the hole's walls provides a self-locking effect and prevents withdrawal or rotation of the pin. The fastening pin is fitted ~~equipped~~ with a head 4 which ~~and located in the threshold strip's channel 5 has the joint 6 situated between head 4 and mandrel 7.~~ which is located in the threshold strip's underside keyway. ~~The joint 6 is in shape of radial narrowing 8 perpendicular to the pin's axis 1 (FIG. 4 and FIG. 5).~~ The head and neck of the pin may be of various designs as shown in Figs 4 and 5, but all are designed to flex or swing in the neck area by means of a thinner section or smaller cross-sectional area at that point.

In solution illustrated in ~~as per FIG. 6 and FIG. 7~~ Figs. 6 and 7 the narrowing is in the form ~~has a form~~ of a groove 9 round the whole circumference of the shoulder ~~mandrel~~, and the head [[4']] 4 ~~has a form of cylinder~~ is cylindrical. [[Such]] This solution allows ~~bending of~~ the pin to flex on its longitudinal ~~in optional plane parallel to it's~~ axis.

~~Onto example of manufacturing presented by FIG. 8 and FIG. 9 the mandrel~~

In the design presented in Figs. 8 and 9 the shoulder has two ~~radial grooves 10~~. indentations on opposite sides of the neck. The position of [[These]] these grooves may lie ~~be shifted each other along the pin axis~~. at any position on the neck relative to the head of the pin.

~~As it is imaged by FIG. 10 and FIG. 11 the joint has form of broken flat~~ In Figs. 10 and 11 the pin has a neck in the shape of a double-offset flat bar 11 ~~and on it's flexures has radial grooves 12 which constrain a place of pin's bending~~. with a thinner section 12 at each offset to allow for a spring effect at this point.

In the solution presented ~~by FIG. 12 and FIG. 13~~ in Figs. 12 and 13 the joint is in the form ~~a shape~~ of a hinge. Between fork like protrusions 13, under the head, ~~there is mandrel 7 rotationally~~

~~mounted onto the dowel 14.~~ the neck has a cross-drilled upper end the two parts being connected by a dowel 14, allowing the head to move through an arc.

~~The joint function accomplish also solution presented by FIG. 14 and fig.15 in which~~ The flexing function is also achieved in the solution presented in Figs. 14 and I5. A cross-section reduction, allowing the [[pin's]] pin ~~bending, is gained by the hole 15 in mandrel 7.~~ to bend at that point is provided by hole I5 in the neck.

~~On FIG. 17 is presented~~ Fig. 17 shows [[the]] a pin equipped with spade-shaped flexible ~~elastic~~ protrusions 2, molded [[made]] round ~~it's axis onto ca. 2/3 of the core 7 length.~~ its longitudinal axis for ca. 2/3 of the lower end of the pin. The part [[Part] of the pin near the head 4 contains radially set tapered alignment splines 16, ~~stabilizing fins 16~~, which have seen ~~in end view almost trapezoid contour~~. side-on have a near –trapezoidal section. These radially set tapered alignment splines [[Fins]] 16 are ~~located~~ arranged ~~symmetrical round the core 7, and its view remains splines.~~ symmetrically round the central body or shank 7. ~~The fin's 16 convergence towards pin's end allows it's insertion into a hole and eliminates hole's manufactuing failures, that is often shattered during it's drilling in foundation.~~ By being wider towards the head of the pin they permit the upper end of the pin to be aligned centrally in the pre-drilled hole and over-ride any faults

caused by the drilling process, such as structural damage to the solid matrix or slight chipping of the edges of the hole.

~~FIG. 21 presents application of the pin for fastening floor's strip 5.~~ Fig. 21 shows a cross-section of a surfaced matrix floor with a typical pin holding a threshold strip 5 in place. After pre-drilling holes ~~carry out the hole~~ 17, the ~~pin's head is placed in channel of the strip 5 and through the strip pins are forced into holes~~.
the heads of the pins are slid into the keyway on the underside of the threshold strip 5.

During such forcing elastic protrusions 2 are deflected towards head, and fins 16stabilize pin's in the hole 17. The pin has narrowing 6, which accomplish the function of joint and in that way allows deflection of the pin's head when foundation is of different height. The pins may then be slid along the keyway to align with the holes and gently and progressively knocked into place by tapping the top surface of the threshold strip with a soft-headed mallet. Due to the interference fit in the holes the spade-shaped protrusions 2 will be deflected upwards to provide a self-locking effect. As the pin reaches its final depth the splines 16 engage positively with the upper walls of the hole 17, providing a positive location. Any misalignment of the row of holes or uneven heights of the adjoining surfaces is compensated by flexing of the neck of the pin at its constriction or in the case of the type of head-

joint in Figs. 12, 13 by the head moving physically about the pivot. If the base surface is uneven along the direction of the threshold strip use of the neck type shown in Figs 10 ,11 will allow the threshold strip itself to be slightly deflected longitudinally, being held in place by the spring-tension in the necks of the pins.